Laura C. Bickel
Senior Counsel
Legal Department

March 16, 2020

VIA E-FILING

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

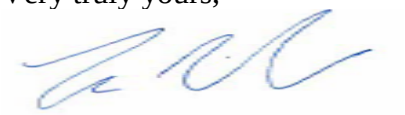
Re: The Narragansett Electric Company d/b/a National Grid - Review of Proposed Power Purchase Agreement Pursuant to R.I. Gen. Laws § 39-26.1: Docket No. 5011

Dear Ms. Massaro:

On behalf of The Narragansett Electric Company d/b/a National Grid (the Company), enclosed for filing with the Rhode Island Public Utilities Commission (the Commission) please find the Company's responses to the first set of data requests issued by the Commission. Consistent with the instructions issued by the Commission today, this filing is being made electronically only. Hard copies will be submitted after the termination of the State of Emergency.

If you have any questions, please contact me at: 781-907-2126. Thank you for your time and attention to this matter.

Very truly yours,



Laura C. Bickel
RI Bar # 10055

Enclosures

cc: Docket No. 5011 Service List

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Docket No. 5011 – The Narragansett Electric Co. d/b/a National Grid's Review of PPA w/ Gravel Pit Solar II, LLC
Service List updated 2/27/2020

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File an original & 9 copies w/: Luly E. Massaro, Commission Clerk Patricia Lucarelli, Commission Counsel Public Utilities Commission 89 Jefferson Blvd. Warwick, RI 02888	Luly.massaro@puc.ri.gov; Alan.nault@puc.ri.gov; Todd.bianco@puc.ri.gov; Patricia.lucarelli@puc.ri.gov; Cynthia.WilsonFrias@puc.ri.gov; Margaret.Hogan@puc.ri.gov;	401-780-2017
Michael Kirkwood, Pascoag Utility District	mkirkwood@pud-ri.org;	

PUC 1-1

Request:

Referencing the McCauley and Wilson prefiled testimony (testimony) on Bates page 32, lines 12 through 15, the witnesses indicate that "all interconnection and transmission upgrade costs are included in the fixed purchase price of energy and RECs, and therefore all electric transmission infrastructure costs have been accounted for in the PPA cost of the energy and RECs"

a. Please indicate if the witnesses are indicating that there are no additional requirements that specifically require National Grid customers to directly pay for electric transmission infrastructure costs for the facility over and above the contract costs, or if the witnesses are saying that the specific negotiated price is known to include transmission infrastructure costs.

b. If the former meaning described in part a is intended, please provide the transmission costs included within the contract cost and explain how the estimated transmission costs were derived.

c. If the latter meaning described in part a is intended, please confirm whether pursuant to this contract the developer retains the right to the benefits (i.e. revenue) from applicable tax credits and Forward Capacity Market Revenue.

    i. If the developer retains the rights to Forward Capacity Market Revenue, please explain if the Forward Capacity Market is designed around the concept of a generator's cost of new entry, which includes fixed costs such as transmission infrastructure costs.

Response:

a. In Section 2.2.3.4. of the Request for Proposals, the Company stated that each bidder "will be responsible for all costs associated with and/or arising from interconnecting its project to the PTF. . . . Proposals must include all interconnection and transmission or distribution system upgrade costs required to ensure full dispatch, including upgrades that may need to occur beyond the point of interconnection." Although National Grid does not know if there are any transmission infrastructure costs, the Seller's fixed contract price for energy and RECs should have included such costs, and National Grid's customers are not responsible for paying anything over the fixed purchase price for energy and RECs (see Schedule NG-1, Exhibit D).

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b. Please see the response to part (a), above.

c. The Seller has the option, but not the obligation, to seek tax credits and participate in the Forward Capacity Market (FCM), and the Seller may retain any associated revenues. See PPA Section 3.7.

i. The Company confirms that the Seller is not transferring the rights to the capacity of the project to the Company.

Yes, the FCM is designed around the concept of producing, on average, and over the long-run, price signals sufficient to reflect the net cost of new entry required to satisfy the system's long-term resource adequacy requirements. Such new entry cost would be expected to include any transmission infrastructure costs the new entry would be expected to be responsible for and thus need to cover as part of its investment.

If the Commission approves the PPA, Gravel Pit Solar would be deemed a new Sponsored Policy Resource and would most likely have to obtain a CSO through the FCM Substitution Auction, for amounts not awarded in a primary auction, under the CASPR rules (Competitive Auctions with Sponsored Policy Resources Project).

PUC 1-2

Request:

Please explain if National Grid is proposing to procure approximately 2.62 megawatts (MW) above the statutory 90 MW Standard. If so:

a. Please provide the expected annual generation from this 2.62 MW.

b. Please explain if National Grid is proposing to collect remuneration on the excess generation in part a. If so, please provide the basis for this proposal and the anticipated annual and total renumeration for this incremental generation.

Response:

National Grid's proposed contract is for 13.36 MW of solar contract capacity, which will result in an additional 2.62 MW under contract than the minimum Long-Term Contracting Standard (LTCS) contract capacity of 90 MW. However, the LTCS will not be fully satisfied until 100 percent of the minimum, long-term contract capacity is met.

a. The contract capacity of 13.36 MW is based on the nameplate capacity of the solar facility in the PPA, multiplied by the expected capacity factor in the first year of operation. Actual output from the facility will vary depending on external factors such as weather, and solar facility output decreases each year due to the degradation of the equipment.

   To calculate the expected annual generation from the 2.62 MW portion of the facility, the Company took the 20-year expected generation from the full 13.36 MW, divided by 20 years, and multiplied by the ratio of 2.62 MW over 13.36 MW. Using these assumptions, the expected annual average generation from the 2.62 MW portion of the facility is 21,910 megawatt-hours.

b. Yes, National Grid is proposing to collect remuneration equal to 2.75 percent of the "actual annual payments" made to Gravel Pit, once it is commercially operating, as provided in Section 39-26.1-4.

   Section 39-26.1.5 states that the purpose of the remuneration is to compensate the Company "for accepting the financial obligation of the long-term contracts" and it does not distinguish between contracts that are below the minimum capacity threshold and those that would exceed it. In addition, in Docket No. 4574, the

Commission approved the Copenhagen Wind Farm PPA, noting that the Company had satisfied 103.8% of the minimum LTCS requirement, with 93.42 MW under contract, or 3.42 MW above the minimum LTCS capacity. Review of Power Purchase Agreement - Copenhagen Wind Farm LLC Pursuant R.I.G.L. § 39-26.1-1 et seq., PUC Order No. 22209 at 1. In approving that contract under the LTCS, the Commission did not limit the Company's remuneration to 90 MW of contract capacity, and there is no basis in the LTCS statute to support doing so here.

The Company estimates that the remuneration on 2.62 MW of the Gravel Pit would be approximately $638,098, with an annual average of $31,904.

PUC 1-3

Request:

Regarding anticipated remuneration associated with the PPA:

a. Is remuneration associated with the proposed PPA included in the BCA provided in Schedule NG-4 on Bates page 335?

b. Please update Schedule NG-4 to identify and, if necessary, include the proposed remuneration.

Response:

a. No.

b. Please refer to line 27 in Attachment PUC 1-3.

Rhode Island Renewable Energy Long Term Contract RFP
Docket 4600 Benefit-Cost Framework - Applicable Category Summary

Power System Level (Cost/Benefit Categories)

			(NPV in 2018$)	Description of quantitative values or reason for exclusion:
(1)	Energy Supply & Transmission Operating Value of Energy Provided or Saved (Time- & Location-	Applicable/Quantifiable	$54,871,248	Market value of Energy from Project.
(2)	Renewable Energy Credit Cost/Value	Applicable/Quantifiable	$24,451,273	Market value of Project RECs retired (used) for RES or sold.
(3)	Retail Supplier Risk Premium	Not Applicable (N/A)	$0	PPA is a long term contract for wholesale power supply at a fixed price.
(4)	Forward Commitment: Capacity Value	Applicable/Not Quantifiable	-	Beyond the capabilities of the modeling system to quantify accurately. Neutral impact.
(5)	Forward Commitment: Avoided Ancillary Services Value	Applicable/Not Quantifiable	-	Beyond the capabilities of the modeling system to quantify accurately. Negative impact, insignificant.
(6)	Utility / Third Party Developer Renewable Energy, Efficiency, or DER costs	Applicable/Quantifiable	($48,466,063)	PPA cost of energy and RECs.
(7)	Electric Transmission Capacity Costs / Value	Applicable/Quantifiable	$0	The Proposal contains a fixed PPA price for energy and REC, with all interconnection and transmission upgrades included in PPA price. The project is commitment to interconnect to the ISO-NE "PTF" at the Capacity Capability Interconnection Standard, as defined by ISO-NE.
(8)	Electric transmission infrastructure costs for Site Specific Resources	Applicable/Quantifiable	$0	The Proposal contains a fixed PPA price for energy and REC, with all interconnection and transmission upgrades included in PPA price. The project is required to interconnect to the ISO-NE "PTF" at the Capacity Capability Interconnection Standard, as defined by ISO-NE.
(9)	Net risk benefits to utility system operations (generation, transmission, distribution)	N/A	$0	Generation supply will be interconnected at the ISO-NE "PTF". This resource is not a DER.
(10)	Option value of individual resources	Applicable/Quantifiable	$2,219,724	RI Energy Market Price Change Impact + RI REC Market Price Change Impact + Benefit to Rhode Island Gas Customers due to Gas Use Reduction (Benefits)
	Option value of individual resources	Applicable/Quantifiable	($3,665,076)	RI Energy Market Price Change Impact + RI REC Market Price Change Impact (Revenue Reduction for existing Long Term Contracts)
	Option value of individual resources	Applicable/Quantifiable	$34,089,848	Other NE States Energy Market Price Change Impact + Other NE States REC Market Price Change Impact + Benefit to Other NE States Gas Customers due to Gas Use Reduction (Benefits)
	Option value of individual resources	Applicable/Quantifiable	($13,704,787)	Other NE States Energy Market Price Change Impact + Other NE States REC Market Price Change Impact (Revenue Reduction for existing Long Term Contracts)
(11)	Investment under Uncertainty: Real Options Cost / Value	Applicable/Quantifiable	Included in categories (1,2,6,10)	Project was selected based on a competitive process of multiple proposals. Evaluation and benefit cost analysis was compared to a basecase that provided a "but for" or "counterfactual" projection of the costs of electric energy, RECs, and carbon emissions associated with Rhode Island electricity consumption under a future in which no proposals are selected.
(12)	Energy Demand Reduction Induced Price Effect	N/A	$0	Generation supply is not an Energy DRIPE, but the proposal's indirect benefit impact on market LMP price change and REC price change is listed above.
(13)	Greenhouse gas compliance costs (Embedded Cost)	Applicable/Quantifiable	Included in category (1)	Greenhouse gas compliance costs (RGGI) is embedded as a fuel related cost in the model analysis to determine the quantitative market impacts listed above.
(14)	Criteria air pollutant and other environmental compliance costs	Applicable/Not quantifiable	-	Not significant value to quantify or differentiate between project. Positive impact, insignificant.
(15)	Innovation and Learning by Doing	Applicable/Not quantifiable	-	The benefits of innovation in the solar industry and by the developer have been captured in the bid pricing of the contract, including, but not limited to any potential federal tax credits, Postive impact, insignificant.
(16)	Distribution capacity costs	N/A	$0	Generation supply will be interconnected at the ISO-NE "PTF". Distribution level category is not applicable to this project.
(17)	Distribution delivery costs	N/A	$0	Generation supply will be interconnected at the ISO-NE "PTF". Distribution level category is not applicable to this project.
(18)	Distribution system safety loss/gain	N/A	$0	Generation supply will be interconnected at the ISO-NE "PTF". Distribution level category is not applicable to this project.
(19)	Distribution system performance	N/A	$0	Generation supply will be interconnected at the ISO-NE "PTF". Distribution level category is not applicable to this project.
(20)	Utility low income	N/A	$0	Generation supply will be interconnected at the ISO-NE "PTF". Distribution level category is not applicable to this project.
(21)	Distribution system and customer reliability / resilience impacts	N/A	$0	Generation supply will be interconnected at the ISO-NE "PTF". Distribution level category is not applicable to this project.
(22)	Distribution system safety loss/gain	N/A	$0	Generation supply will be interconnected at the ISO-NE "PTF". Distribution level category is not applicable to this project.

Customer Level (Cost/Benefit Categories)

(23)	Program participant / prosumer benefits / costs	N/A	$0	Proposed rate recovery through distribution rates applicable to all distribution customers.
(24)	Participant non-energy costs/benefits: Oil, Gas, Water, Waste Water	N/A	$0	Proposed rate recovery through distribution rates applicable to all distribution customers.
(25)	Low-Income Participant Benefits	N/A	$0	Proposed rate recovery through distribution rates applicable to all distribution customers.
(26)	Consumer Empowerment & Choice	N/A	$0	Proposed rate recovery through distribution rates applicable to all distribution customers.
(27)	Non-participant (equity) rate and bill impacts	Applicable/Quantifiable	($1,332,817)	Remuneration equal to 2.75% of PPA Cost of energy and RECs. Proposed rate recovery through distribution rates applicable to all distribution customers.

Societal Level (Cost/Benefit Categories)

(28)	Greenhouse gas externality costs	Applicable/Quantifiable	$40,320,033	Impact of Reduction in GHG Emissions
(29)	Criteria air pollutant and other environmental externality costs	Applicable/Quantifiable	$1,593,093	Impact of Reduction in NOx Emissions
(30)	Conservation and community benefits	Applicable/Not quantifiable	-	The project must be reviewed and approved by the Connecticut Siting Council, which preempts local permit requirements. Development and Management Plan must then be approved by CSC, and stormwater and dewatering discharge permit must be issued by Connecticut Department of Energy and Environmental Protection. Gravel Pit Solar is strategically sited on a gravel mine, is not visible from homes or roads, has no sensitive natural resources, thereby minimizing and avoiding environmental impacts. Additionally, using the latest inverter technology, tracking panel rack systems, bi-facial panels, and the newest engineering approaches the proposed project will produce substantially more energy from a smaller footprint than similar solar projects. In consideration of land use impact the Gravel Pit Solar project has a direct societal benefit relative to the development and deployment of other projects mounted on greenfield parcels which can disrupt the carbon absorption capacity of forest, open space and farmland. Positive impact, unknown magnitude.
(31)	Non-energy costs/benefits: Economic Development	Applicable/Quantifiable	$121,371	Economic Benefit to Rhode Island. The project made a commitment to invest at least $300,000 in training RI new energy workforce.
(32)	Innovation and knowledge spillover	Applicable/Not quantifiable	-	The DESRI-North Light team has developed, constructed, and operated over 300 MW of new solar in ISO-NE. DESRI Renewables' parent company D.E. Shaw Renewable Investments, LLC (DESRI) was formed in 2011, and is an experienced owner operator of utility-scale solar across the U.S. Their total portfolio includes projects of comparable size. Positive impact, small.
(33)	Societal Low-Income Impacts	N/A	$0	Proposed rate recovery through distribution rates applicable to all distribution customers.
(34)	Public Health	Applicable/Not quantifiable	Included in category (28) and (29)	Pollutants emitted by the electric power sector cause damage to human health, including increased morbidity and mortality. Over the course of its operating life, the Gravel Pit Solar project will displace thermal generation which will result in reduced emissions of harmful pollutants, which can be translated to societal benefits. The societal benefits for GHG and NOx emissions reduction are listed above in (28) and (29). Positive impact, significant.
(35)	National Security and US international influence	Applicable/Not quantifiable	Included in category (1) and (28)	The project will contribute to reducing oil consumption, attributed to winter fuel switching, by approximately 330,000 Bbls. The economic and environmental impacts have been captured in the market value and GHG emission reduction listed in (1) and (28). Positive impact, small.

Total Net Benefits:	**$90,497,847**

PUC 1-4

Request:

Were any extreme weather events, such as an extreme winter, included in the development of the price analysis used to compare different resources. For example, did the price analysis include incremental benefits of wind performance during extreme winter conditions?

Response:

The Company did not include any extreme weather events in its analysis. All weather sensitive inputs going into the model such as system load and fuel forecasts are based on "normal" weather conditions (50% probability of forecast being exceeded per the ISO New England Inc. Forecast Report of Capacity, Energy, Loads, and Transmission). Hourly demand profiles for system load, and generation profiles for PV and wind were based on 2012 weather patterns for consistency.

PUC 1-5

Request:

Were any extreme weather events included in the evaluations in Stage 3?

Response:

No. Please see the Company's response to data request PUC 1-4.

PUC 1-6

Request:

Were any extreme weather events included in the benefit cost analysis summarized in Schedule NG-4?

Response:

No. Please see the Company's response to data request PUC 1-4.

PUC 1-7

Request:

Reference is made to PUC 2-5 in Docket No. 4929. Please provide the annual average locational marginal price (LMP) the proposed delivery point, or wholesale energy price if LMP is not available, for each of the last twenty calendar years.

Response:

Year	Barbour Hill LD.BARBOURH115	Barbour Hill LD.BARBOURH23	Barbour Hill Combined *
2000	*Not Available*	*Not Available*	*Not Available*
2001	*Not Available*	*Not Available*	*Not Available*
2002	*Not Available*	*Not Available*	*Not Available*
2003	$47.28	*Not Available*	$47.28
2004	$53.70	*Not Available*	$53.70
2005	$79.68	*Not Available*	$79.68
2006	$64.24	*Not Available*	$64.24
2007	$68.86	$84.74	$70.90
2008	*Not Available*	$83.31	$83.31
2009	*Not Available*	$42.22	$42.22
2010	*Not Available*	$50.11	$50.11
2011	*Not Available*	$46.89	$46.89
2012	*Not Available*	$36.48	$36.48
2013	*Not Available*	$55.26	$55.26
2014	*Not Available*	$63.77	$63.77
2015	*Not Available*	$41.18	$41.18
2016	*Not Available*	$29.56	$29.56
2017	*Not Available*	$33.07	$33.07
2018	*Not Available*	$43.73	$43.73
2019	*Not Available*	$30.83	$30.83

* The proposed Delivery Point will be the pnode established for the Facility by ISO-NE in the vicinity of the interconnection of the Facility to Pool Transmission Facilities ("PTF") at a new substation to be built delivering to the Barbour Hill substation.

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PUC 1-8

Request:

Reference is made to PUC 2-6 in Docket No. 4929. Please provide the annual average REC price for each year since 2011.

Response:

The table below summarizes the annual average REC prices for Rhode Island New RECs:

Year	Annual Average RI New REC Prices
2011	$30.49
2012	$59.16
2013	$63.79
2014	$57.76
2015	$48.95
2016	$35.68
2017	$23.75
2018	$14.90
2019	$11.77

Source: S&P Global Market Intelligence

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PUC 1-9

Request:

Reference is made to PUC 2-7 in Docket No. 4929. Please provide a table and graph comparing the proposed energy and REC prices in the proposed PPA to the energy and REC prices identified in PUC 1-5 and 1-6.

Response:

The first table below presents the locational marginal price from PUC 1-7 and the REC price from PUC 1-8, in dollars per megawatt-hour (MWh). The second table below presents the energy and REC price, in dollars per MWh, for the 20 years of the PPA.

Locational Marginal Prices at Delivery Point and REC Pricing

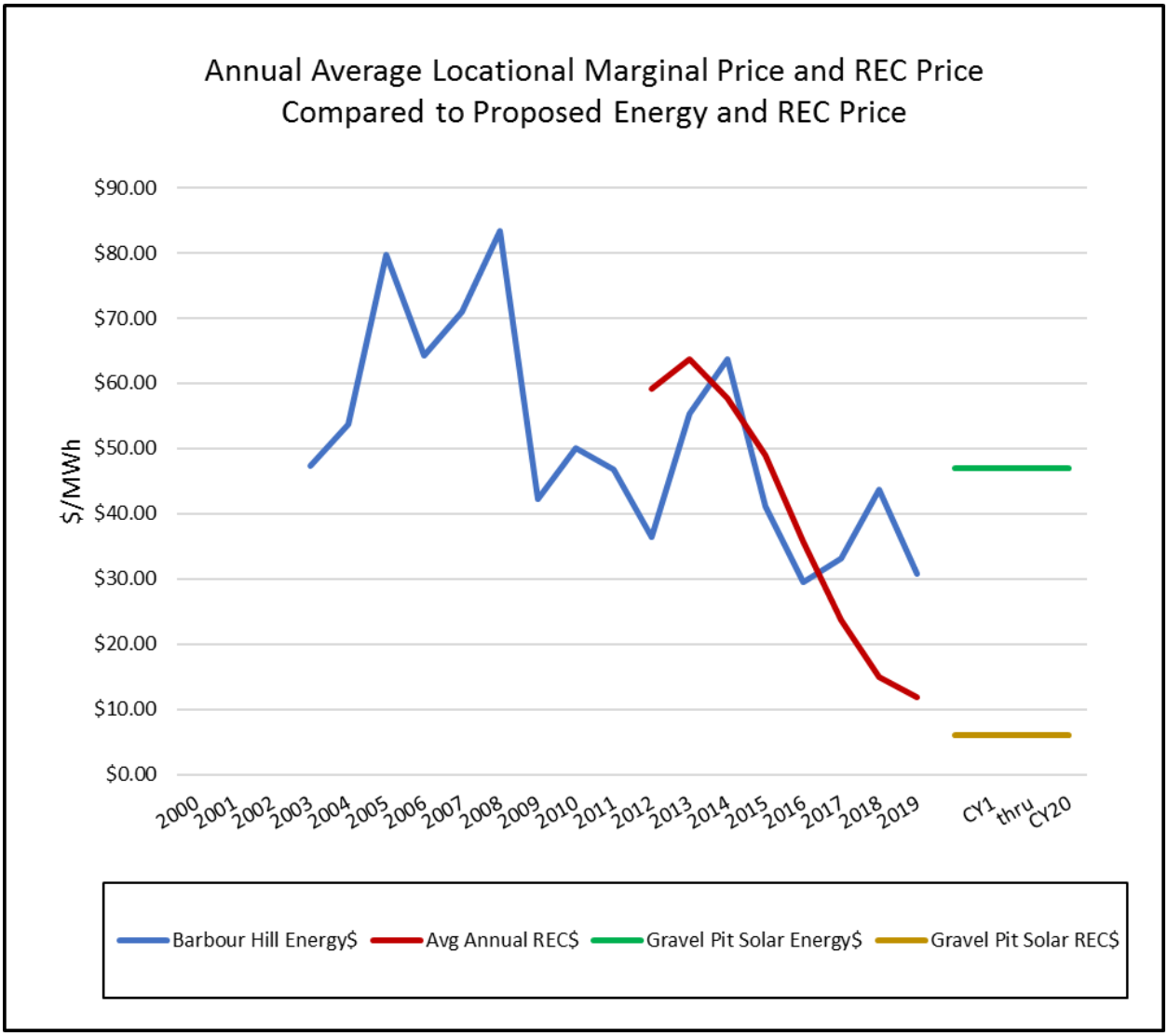
Year	Delivery Point Barbour Hill *	Average Annual RI New REC Price
2000	*Not Available*	
2001	*Not Available*	
2002	*Not Available*	
2003	$47.28	
2004	$53.70	
2005	$79.68	
2006	$64.24	
2007	$70.90	
2008	$83.31	
2009	$42.22	
2010	$50.11	
2011	$46.89	$30.49
2012	$36.48	$59.16
2013	$55.26	$63.79
2014	$63.77	$57.76
2015	$41.18	$48.95
2016	$29.56	$35.68
2017	$33.07	$23.75
2018	$43.73	$14.90
2019	$30.83	$11.77

* The proposed Delivery Point will be the pnode established for the Facility by ISO-NE in the vicinity of the interconnection of the Facility to Pool Transmission Facilities ("PTF") at a new substation to be built delivering to the Barbour Hill substation.

Gravel Pit Solar

Contract Year	Energy Price	REC Price
CY1 (2023)	$46.950	$6.00
CY2 (2024)	$46.950	$6.00
CY3 (2025)	$46.950	$6.00
CY4 (2026)	$46.950	$6.00
CY5 (2027)	$46.950	$6.00
CY6 (2028)	$46.950	$6.00
CY7 (2029)	$46.950	$6.00
CY8 (2030)	$46.950	$6.00
CY9 (2031)	$46.950	$6.00
CY10 (2032)	$46.950	$6.00
CY11 (2033)	$46.950	$6.00
CY12 (2034)	$46.950	$6.00
CY13 (2035)	$46.950	$6.00
CY14 (2036)	$46.950	$6.00
CY15 (2037)	$46.950	$6.00
CY16 (2038)	$46.950	$6.00
CY17 (2039)	$46.950	$6.00
CY18 (2040)	$46.950	$6.00
CY19 (2041)	$46.950	$6.00
CY20 (2042)	$46.950	$6.00

Note: The price under the PPA is inclusive of energy and RECs. The purchase price allocated to energy, in the event that the RECs associated with the Facility fail to satisfy the Renewable Energy Standard as an Environmental Attribute, is $46.95 per MWh, which is used to present the prices for energy and RECs above for purposes of comparison (see National Grid Initial Filing at Bates page 000105).


Annual Average Locational Marginal Price and REC Price
Compared to Proposed Energy and REC Price
$/MWh
$90.00
$80.00
$70.00
$60.00
$50.00
$40.00
$30.00
$20.00
$10.00
$0.00
2000
2001
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2016
2017
2018
2019
CY1 thru CY20
Barbour Hill Energy$
Avg Annual REC$
Gravel Pit Solar Energy$
Gravel Pit Solar REC$

PUC 1-10

Request:

Reference is made to PUC 2-8 and PUC 5-1 in Docket No. 4929. Please provide a table and graph showing the projected above- or below-market cost of the PPA for each year of the term of the PPA in nominal and 2018$. Please add a column that can be summed to equal the reported direct benefits for the PPA. Please provide the discount rate and the interest rate used.

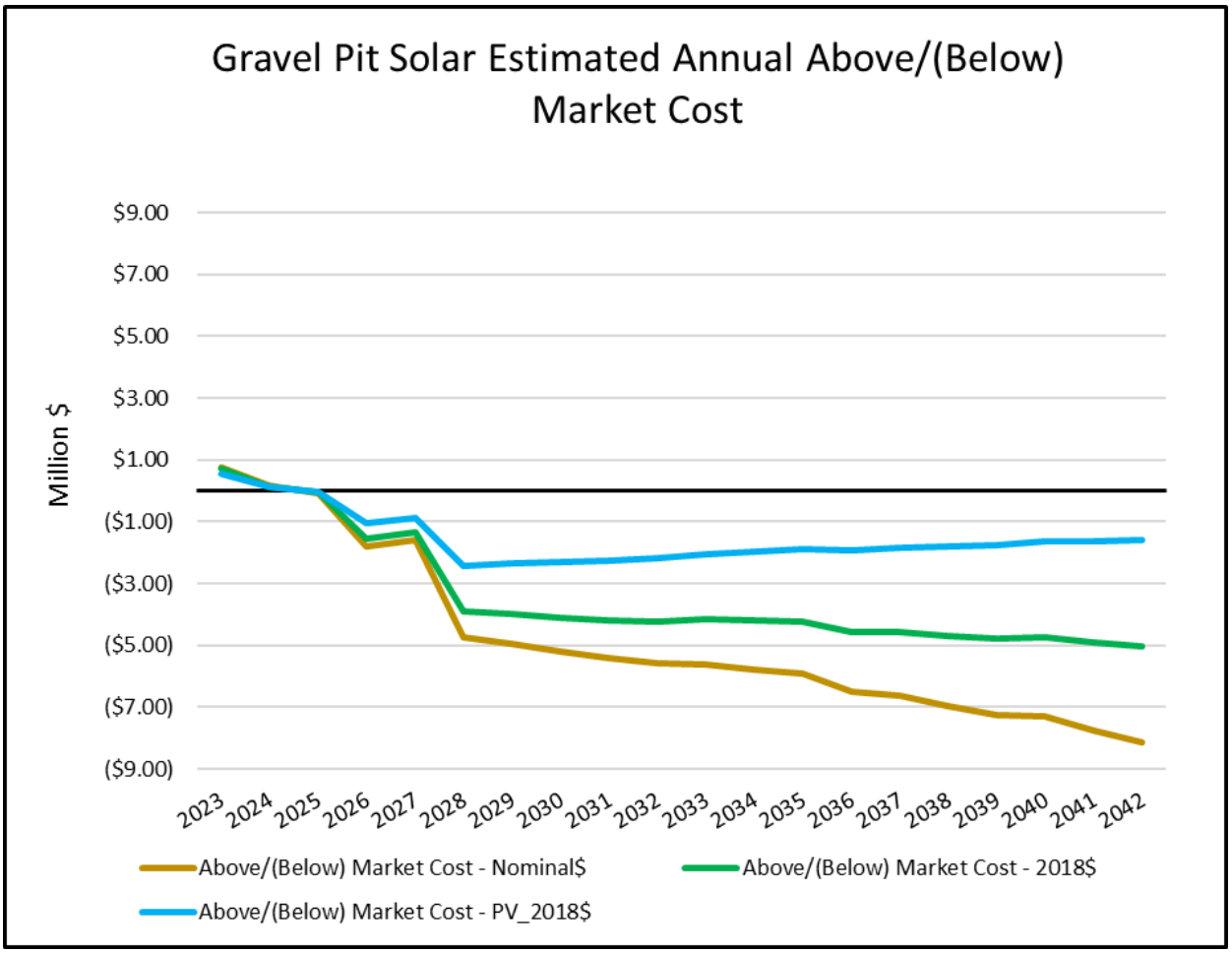
Response:

Year	**Annual Above/(Below) Market Cost** *Nominal$*	**Annual Above/(Below) Market Cost** *2018$* †	**Annual Above/(Below) Market Cost** *NPV 2018$* ‡
2023	$775,271	$702,187	$553,016
2024	$170,009	$150,963	$113,348
2025	($60,012)	($52,244)	($37,397)
2026	($1,786,795)	($1,525,012)	($1,040,709)
2027	($1,603,086)	($1,341,391)	($872,706)
2028	($4,733,053)	($3,882,752)	($2,408,294)
2029	($4,950,409)	($3,981,431)	($2,354,323)
2030	($5,216,794)	($4,113,406)	($2,318,918)
2031	($5,405,986)	($4,179,003)	($2,246,019)
2032	($5,558,573)	($4,212,704)	($2,158,533)
2033	($5,598,455)	($4,159,734)	($2,031,984)
2034	($5,771,385)	($4,204,141)	($1,957,893)
2035	($5,926,006)	($4,232,131)	($1,879,005)
2036	($6,494,017)	($4,546,847)	($1,924,580)
2037	($6,636,685)	($4,555,625)	($1,838,360)
2038	($6,972,350)	($4,692,192)	($1,805,159)
2039	($7,256,382)	($4,787,585)	($1,755,954)
2040	($7,293,726)	($4,717,866)	($1,649,678)
2041	($7,758,826)	($4,920,305)	($1,640,222)
2042	($8,113,213)	($5,044,159)	($1,603,084)
			($30,856,458)

† The energy market models assume all financial parameters to be in real 2018 dollars and are indexed to that based on a 2% rate of inflation.

‡ The quantitative evaluation was for the period 2021-2045 with the Net Present Value calculated to the year 2018, at a real discount rate of 4.892%.

Prepared by or under the supervision of: Stephen McCauley and Katherine Wilson



Note: The projected annual above/below market costs are based on the total net direct benefits, or the annual contract costs compared to a market forecast for energy and RECs.

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PUC 1-11

Request:

Please provide the same information as provided in response to PUC 1-8, but if anticipated remuneration is included in the data reported in 1-8, please exclude it in the response here, and vice versa.

Response:

Year	Annual Above/(Below) Market Cost With Remuneration *Nominal$*	Annual Above/(Below) Market Cost With Remuneration *2018$* †	Annual Above/(Below) Market Cost With Remuneration *NPV 2018$* ‡
2023	$945,914	$856,743	$674,739
2024	$340,390	$302,256	$226,943
2025	$108,932	$94,832	$67,882
2026	($1,618,693)	($1,381,539)	($942,799)
2027	($1,435,822)	($1,201,432)	($781,650)
2028	($4,566,047)	($3,745,749)	($2,323,317)
2029	($4,784,810)	($3,848,246)	($2,275,567)
2030	($5,052,021)	($3,983,484)	($2,245,675)
2031	($5,242,035)	($4,052,264)	($2,177,903)
2032	($5,394,874)	($4,088,641)	($2,094,965)
2033	($5,436,136)	($4,039,129)	($1,973,070)
2034	($5,609,876)	($4,086,491)	($1,903,103)
2035	($5,765,303)	($4,117,363)	($1,828,049)
2036	($6,333,561)	($4,434,502)	($1,877,027)
2037	($6,477,581)	($4,446,411)	($1,794,289)
2038	($6,814,040)	($4,585,654)	($1,764,172)
2039	($7,098,862)	($4,683,658)	($1,717,836)
2040	($7,136,448)	($4,616,133)	($1,614,106)
2041	($7,602,874)	($4,821,407)	($1,607,254)
2042	($7,958,039)	($4,947,684)	($1,572,424)
			($29,523,641)

† The energy market models assume all financial parameters to be in real 2018 dollars and are indexed to that based on a 2% rate of inflation.

‡ The quantitative evaluation was for the period 2021-2045 with the Net Present Value calculated to the year 2018, at a real discount rate of 4.892%.

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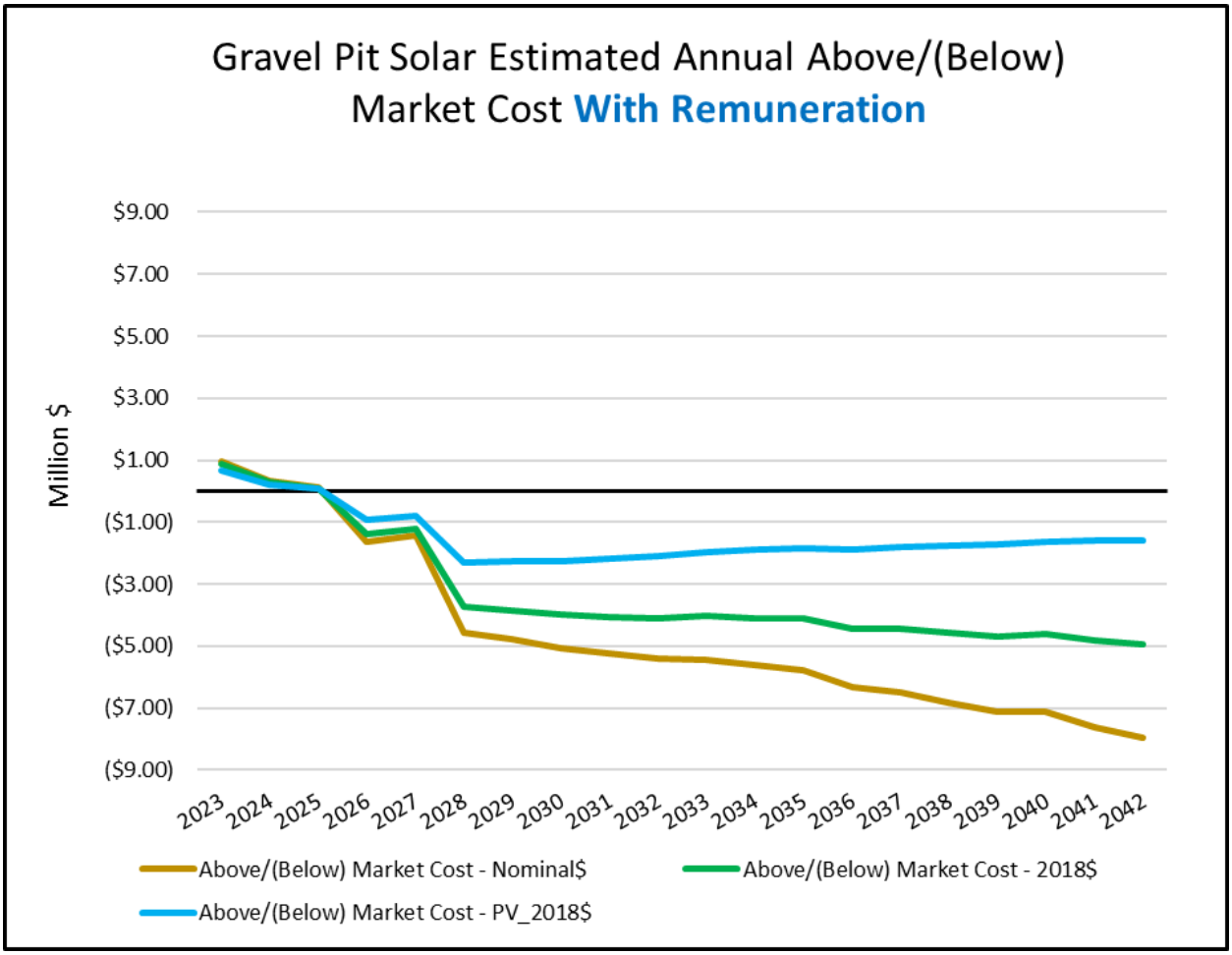

Note: The projected annual above/below market costs are based on the total net direct benefits, or the annual contract costs compared to a market forecast for energy and RECs.

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PUC 1-12

Request:

Reference is made to PUC 2-9 and 5-4 in Docket No. 4929. In a single table, please provide:

a. The expense or credit projected to flow through the LTCRER each year of the term of the PPA. Please calculate the proposed remuneration separately, including totals.

b. The above- and below-market cost projections for each year of the PPA with and without remuneration and provide a unitized amount per kWh across all distribution customers.

Response:

Year	Projected Above/(Below) Market Cost *Nominal$*	Projected Remuneration @ 2.75% *Nominal$*	Above/(Below) Market Cost, with Remuneration *Nominal$*	Forecasted kilowatt-hours (FkWhx) † *kWh*	Net Direct Benefits Annual Unitized Amount per kWh *$/kWh*	With Remuneration Annual Unitized Amount per kWh *$/kWh*
	(A)	(B)	(C = A + B)	(D)	(E = A / D)	(F = C / D)
2023	$775,271	$170,643	$945,914	6,826,035,486	$0.00011	$0.00014
2024	$170,009	$170,381	$340,390	6,826,035,486	$0.00002	$0.00005
2025	($60,012)	$168,945	$108,932	6,826,035,486	($0.00001)	$0.00002
2026	($1,786,795)	$168,102	($1,618,693)	6,826,035,486	($0.00026)	($0.00024)
2027	($1,603,086)	$167,263	($1,435,822)	6,826,035,486	($0.00023)	($0.00021)
2028	($4,733,053)	$167,006	($4,566,047)	6,826,035,486	($0.00069)	($0.00067)
2029	($4,950,409)	$165,599	($4,784,810)	6,826,035,486	($0.00073)	($0.00070)
2030	($5,216,794)	$164,773	($5,052,021)	6,826,035,486	($0.00076)	($0.00074)
2031	($5,405,986)	$163,950	($5,242,035)	6,826,035,486	($0.00079)	($0.00077)
2032	($5,558,573)	$163,699	($5,394,874)	6,826,035,486	($0.00081)	($0.00079)
2033	($5,598,455)	$162,319	($5,436,136)	6,826,035,486	($0.00082)	($0.00080)
2034	($5,771,385)	$161,509	($5,609,876)	6,826,035,486	($0.00085)	($0.00082)
2035	($5,926,006)	$160,703	($5,765,303)	6,826,035,486	($0.00087)	($0.00084)
2036	($6,494,017)	$160,456	($6,333,561)	6,826,035,486	($0.00095)	($0.00093)
2037	($6,636,685)	$159,104	($6,477,581)	6,826,035,486	($0.00097)	($0.00095)
2038	($6,972,350)	$158,310	($6,814,040)	6,826,035,486	($0.00102)	($0.00100)
2039	($7,256,382)	$157,520	($7,098,862)	6,826,035,486	($0.00106)	($0.00104)
2040	($7,293,726)	$157,278	($7,136,448)	6,826,035,486	($0.00107)	($0.00105)
2041	($7,758,826)	$155,952	($7,602,874)	6,826,035,486	($0.00114)	($0.00111)
2042	($8,113,213)	$155,174	($7,958,039)	6,826,035,486	($0.00119)	($0.00117)

† Forecasted kWh per Company forecast - CY 2023.

Note: The projected expenses (credits) are based on a market forecast for energy and RECs and estimated annual energy production.

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PUC 1-13

Request:

Reference is made to PUC 2-10 and 2-11 in Docket No. 4929. Please compare the energy prices in the PPA to the current Standard Offer rate and the rate approved for April 1, 2020, excluding capacity charges from the Standard Offer rates. Please compare the REC prices in the PPA to the current RES charge and National Grid's most recent estimate of New REC prices.

Response:

The PPA price of 5.295 cents per kilowatt-hour (kWh) is for 100% of the energy and Renewable Energy Certificates (RECs) that are delivered to National Grid (which will be 99% of the project's output). The table below compares this PPA price to the Estimated Energy Components of the Base Standard Offer Service (SOS) Rates for the Residential Group and the Base Renewable Energy Standard (RES) Charges. Please note that the Energy Component includes an estimate for line losses.

	Current SOS Rate (cents/kWh)	**Proposed April 1, 2020 SOS Rate** (cents/kWh)
Energy Component:	6.466	3.512
RES Charge:	0.183	0.606
Total:	6.649	4.118
PPA Price:	5.295	5.295

The Base RES Charge is designed to recover the Company's estimate of the costs to comply with the RES in a given Compliance Year. Notably, the RES requires the Company to procure certain portions of its energy, expressed in percentages, from New renewable energy resources and Existing renewable energy resources. The RES Charge in the previous table includes the following estimated REC prices and compliance percentages:

	New Compliance %	**New REC Price ($/MWh)**	**Existing Compliance %**	**Existing REC Price ($/MWh)**
Current SOS Rate (cents / kWh)	12.50%	13.35	2.00%	1.50
Proposed April 1, 2020 SOS Rate (cents / kWh)	14.00%	40.08	2.00%	1.23

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The Company will receive New RECs from Gravel Pit Solar II equal to 100% of the delivered energy. Accordingly, the Company submits that the most reasonable comparison would be to examine the bundled PPA price and compare it to the Estimated Energy Components of Base SOS Rates and the New REC price estimates that are included in the applicable RES Charge because the New REC price is not modified by a RES compliance percentage. This comparison is presented in the following table:

	Current SOS Rate (cents/kWh)	**Proposed April 1, 2020 SOS Rate** (cents/kWh)
Energy Component:	6.466	3.512
New REC Price:	1.335	4.008
Total:	7.801	7.520
PPA Price:	5.295	5.295

Note: The PPA price is $52.95 per megawatt-hour (MWh) and includes both energy and RECs. Also, the purchase price allocated to energy, in the event that the RECs fail to qualify as Environmental Attributes under the RES, is $46.95 per MWh (see National Grid Initial Filing at Bates page 000105). Accordingly, the Gravel Pit Solar II bid was evaluated with an energy price of $46.95/MWh and a REC price of $6.00/MWh, over the term of the contract.

In sum, the allocated/evaluated REC price of 0.600 cents/kWh compares favorably to both the current and forecasted RES charges as well as the estimated current and forecasted New REC prices that are listed above.

PUC 1-14

Request:

Reference is made to PUC 4-1 in Docket No. 4929. Chart 1 (RFP Schedule) in National Grid's RFP issued pursuant to the PUC's decision in Docket No. 4822 lists RFP events and anticipated dates. Please add a column to this table indicating the actual date the event occurred or, for events that have not yet occurred, the currently anticipated date.

Response:

Chart 1
RFP Schedule

Event	**Anticipated Dates**	**Actual Dates**
Issue RFP	September 12, 2018	September 12, 2018
Bidders Conference	September 26, 2018	September 26, 2018
Submit Notice of Intent to Bid	September 28, 2018	September 28, 2018
Deadline for Submission of Questions	September 28, 2018	September 28, 2018
Due Date for Submission of Proposals	October 29, 2018 by 12:00 p.m. (noon) EPT	October 29, 2018 by 12:00 p.m. (noon) EPT
Review of Bids with the Rhode Island Office of Energy Resources ("OER") and the Rhode Island Division of Public Utilities and Carriers ("Division")	November 5, 2018	November 5, 2018
Conditional selection of Bidder(s) for negotiation	May 2, 2019	July 25, 2019
Negotiate and Execute Contracts	July 29, 2019	December 20, 2019
Submit Contracts for PUC Approval	August 30, 2019	February 5, 2020

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PUC 1-15

Request:

Reference is made to PUC 3-11 in Docket No. 4929. Please recalculate the results and benefits and costs of the energy market and economic models assuming 1%, 3% and 7% discount rates. Please provide graphs of the annual PPA above- or below-market costs using these discount rates and the rate used in the filing.

Response:

Please refer to Attachment PUC 1-15-1, for a summary of results and benefits[1] and costs of energy market models, assuming 1%, 3% and 7% discount rates, and to Attachment PUC 1-15-2 for a graph of the annual PPA above- or below-market cost in each year, using these discount rates and the rate used in the Company's filing.

[1] Benefits and costs are based on 100% of the project output as evaluated by TCR.

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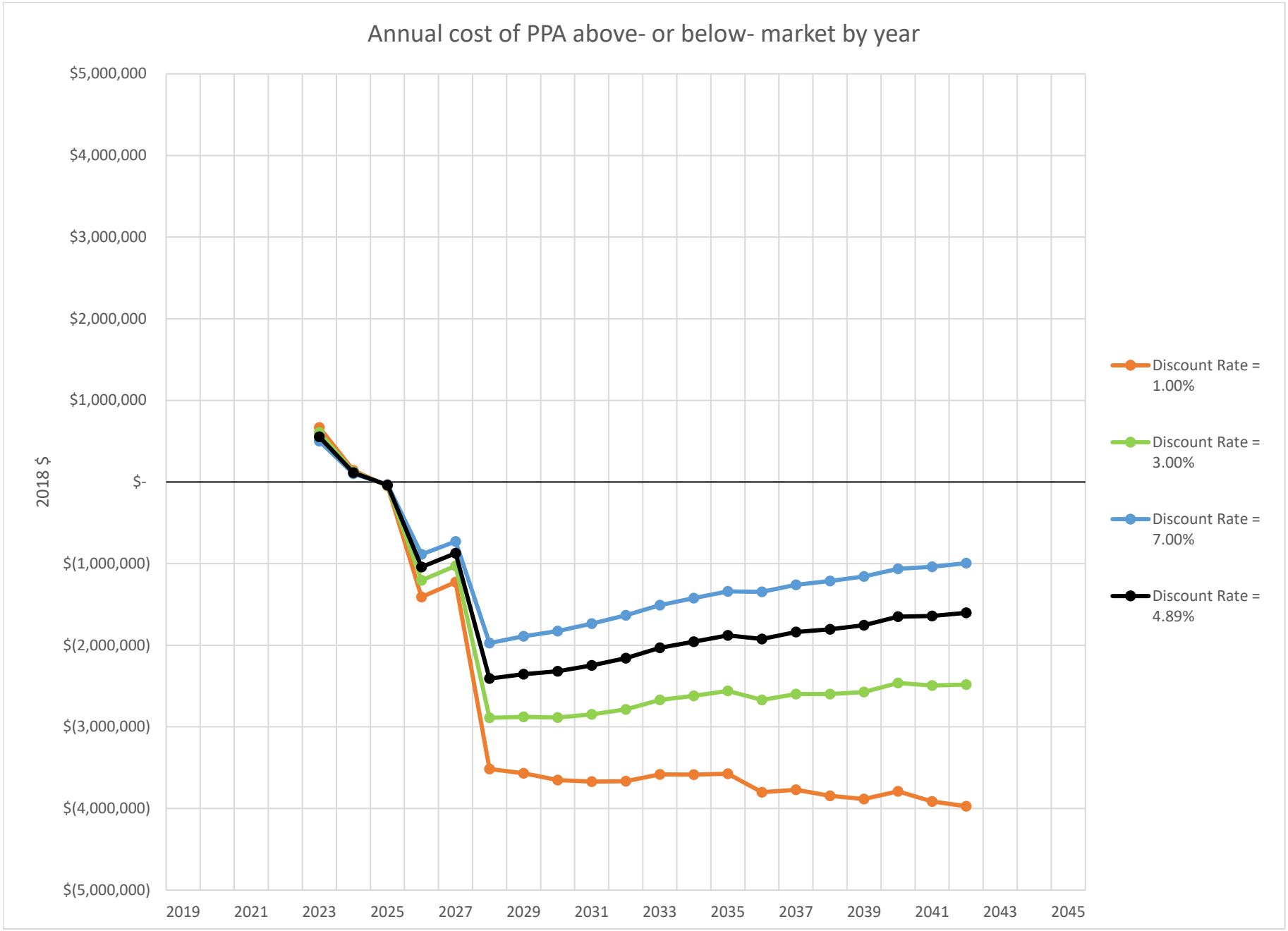
Quantitative Results, 2018$ / MWh

Discount Rate Assumed	1.00%	3.00%	4.89%	7.00%
Proposal Details (From CPPD)				
Resource Type	Solar	Solar	Solar	Solar
Contract Maximum Amount (MW)	50	50	50	50
Project Net Capacity Factor (%)	0.271136619	0.271136619	0.271136619	0.271136619
Proposed Annual Delivery (MWh)	118839.18	118839.18	118839.18	118839.18
Storage Included	No	No	No	No
PPA Start Date	12/31/2022	12/31/2022	12/31/2022	12/31/2022
PPA End Date	12/30/2042	12/30/2042	12/30/2042	12/30/2042
Term (years)	20	20	20	20
ISO-NE Load Zone	4004 .Z.CONNECTICUT	4004 .Z.CONNECTICUT	4004 .Z.CONNECTICUT	4004 .Z.CONNECTICUT
Quantitative Metric Summary	**2018$/MWh**	**2018$/MWh**	**2018$/MWh**	**2018$/MWh**
D.1 Direct Metrics				
Direct Cost of Project Energy	$ 35.81	$ 36.26	$ 36.68	$ 37.11
Direct Cost of Project RECs	$ 4.58	$ 4.63	$ 4.69	$ 4.74
Sub total - Direct Cost of Project Energy + RECs	**$ 40.39**	**$ 40.90**	**$ 41.36**	**$ 41.86**
Market Value of Energy from Project	$ 47.61	$ 47.20	$ 46.83	$ 46.45
Value of Project RECs used for RPS (Qty of RECs * Base Case REC price avoided)	$ 3.66	$ 3.10	$ 2.64	$ 2.21
Value of Project RECs sold out of state (Qty of RECs * Proposal Case REC price)	$ 18.79	$ 18.55	$ 18.23	$ 17.76
Direct Benefit of Project Energy + RECs	**$ 70.06**	**$ 68.85**	**$ 67.70**	**$ 66.41**
Total Net Direct Benefit (Cost) of Project	$ 29.67	$ 27.96	$ 26.33	$ 24.56

Net Direct Benefit (Cost) : Absolute value	$ 57,665,134	$ 41,550,889	$ 30,856,458	$ 22,450,664


Annual cost of PPA above- or below- market by year
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$-
$(1,000,000)
$(2,000,000)
$(3,000,000)
$(4,000,000)
$(5,000,000)
2018 $
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
2045
Discount Rate = 1.00%
Discount Rate = 3.00%
Discount Rate = 7.00%
Discount Rate = 4.89%

PUC 1-16

Request:

Reference is made to PUC 3-21 in Docket No. 4929. Please confirm whether or not National Grid or its consultant conducted multiple model runs representing a range of energy market and or economic conditions, assumptions, and inputs. If multiple model runs were not conducted, please explain why. Please respond separately for the energy market and economic analysis.

Response:

In evaluating the Gravel Pit Solar project, National Grid did not ask its consultant to conduct multiple model runs representing a range of energy market and/or economic conditions, assumptions, and inputs.

The base case, and each proposal case, requires values for hundreds of input assumptions that can be grouped into about 10 major categories. The consultant has documented the source of each of the assumptions, and the majority of them were drawn from public sources. The goal was to develop reasonable representative values for each assumption in order to develop a reasonable Base Case and reasonable Proposal Cases. The development and vetting of these input assumptions was comprehensive. There is perpetual uncertainty associated with the various projections used to establish the base case and proposal cases, and these are not meant to be definitive forecasts of or plans for the New England electricity markets. However, consistent with the approach taken in past studies, National Grid and its consultant focused on establishing inputs and assumptions that would be considered appropriate and reasonable given the latest and best available data from independent sources.

The Company performed a sensitivity analysis after the project selection process, utilizing variations determined in the responses to PUC 5-7 in Docket No. 4929. In that prior analysis, National Grid and its consultant chose to vary the natural gas price forecast inputs to illustrate the sensitivity of model outputs. The Company used the output range of Rhode Island electric prices from this analysis to establish a 15% bandwidth of higher and lower energy prices to test the sensitivity of the benefits. The Company also included in the low case sensitivity analysis a forecasted reduction in REC pricing during the years 2026-2028.

Please refer to Attachment PUC 1-16-1, which provides recalculations of lines 1-6 of the total net direct benefits table that illustrate the sensitivity of the model outputs, and Attachment PUC 1-16-2, which provides a comparison of annual Proposal Pricing to forecasted market value of energy and RECs, in Nominal$/MWh. The analysis shows that under the low case scenario, the contract price is forecasted to be below the market price of energy and RECs other than the

first 6 years. The results of the performed sensitivity analysis demonstrate that the net direct benefits from the project range from +$18.8 Million to +$39.0 Million.

The Company did not perform a sensitivity analysis on the Economic Benefits to Rhode Island because Gravel Pit Solar has committed to a fixed benefit with no variability (see Schedule NG-4, line 31).

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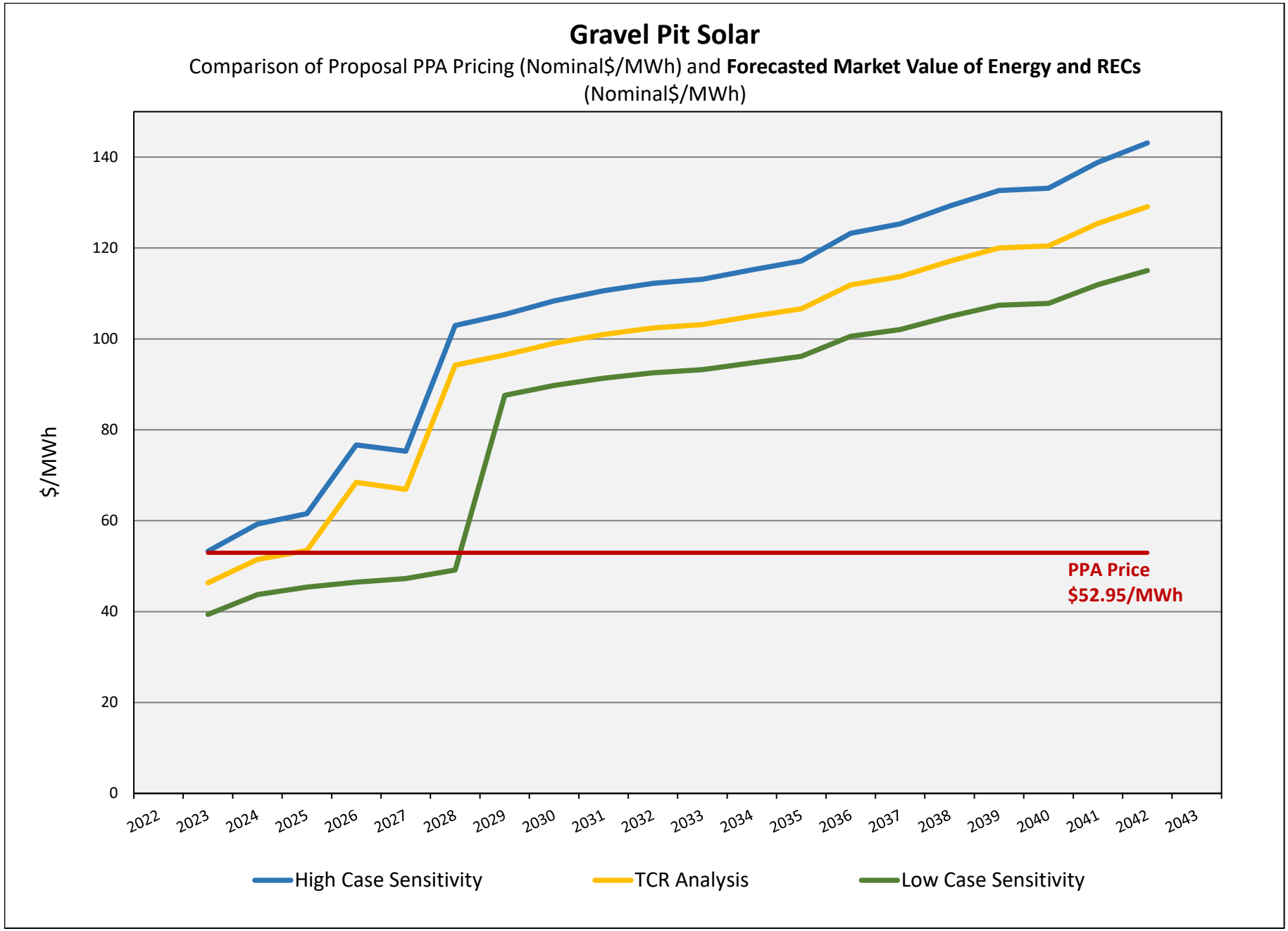
RHODE ISLAND BENEFIT COST TEST

Quantitative Analysis of Categories from the Docket 4600 Framework

Gravel Pit Solar, LLC / Levelized / 20 Yr PPA

		2018$	2018$	2018$
	Proposal Summary of Cost and Benefits for Business Case	**As Filed**	**Sensitivity 1:** High Energy Price Forecast	**Sensitivity 2:** Low Energy Price Forecast with 3yr REC Price Reduction (1)
	Direct Cost of Project			
(1)	Proposal Case - Cost of energy from Project	($42,974,156)	($42,974,156)	($42,974,156)
(2)	Proposal Case - Cost of RECs from Project	($5,491,907)	($5,491,907)	($5,491,907)
(3)	**Direct Cost of Project energy + RECs** *(3) = (1) + (2)*	**($48,466,063)**	**($48,466,063)**	**($48,466,063)**
(4)	Market value of Energy from Project	$54,871,248	$63,101,935	$46,640,561
(5)	Market value of Project RECs retired (used) for RES or sold	$24,451,273	$24,451,273	$20,706,846
(6)	**Net Direct Benefits** *(6) = (3) + (4) + (5)*	**$30,856,458**	**$39,087,145**	**$18,881,343**

Note 1: For the low case sensitivity, the REC Pricing, for the years 2026-2028, were set at the minimum value which represents a forecasted REC oversupply during this period.


Gravel Pit Solar
Comparison of Proposal PPA Pricing (Nominal$/MWh) and Forecasted Market Value of Energy and RECs
(Nominal$/MWh)
$/MWh
140
120
100
80
60
40
20
0
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
PPA Price
$52.95/MWh
High Case Sensitivity
TCR Analysis
Low Case Sensitivity

PUC 1-17

Request:

Please provide a table that compares the energy price of the PPA to the forecasted market price for each year of the PPA. Please provide the same for the REC price and forecast. Please provide graphs of the data in each table.

Response:

	Forecasted Market †		Gravel Pit Solar	
Year	Energy Price	REC Price	Energy Price	REC Price
2023	$44.13	$2.21	$46.950	$6.00
2024	$49.24	$2.25	$46.950	$6.00
2025	$51.17	$2.30	$46.950	$6.00
2026	$52.37	$16.06	$46.950	$6.00
2027	$53.27	$13.64	$46.950	$6.00
2028	$55.48	$38.74	$46.950	$6.00
2029	$56.48	$40.00	$46.950	$6.00
2030	$59.05	$40.00	$46.950	$6.00
2031	$60.96	$40.00	$46.950	$6.00
2032	$62.39	$40.00	$46.950	$6.00
2033	$63.17	$40.00	$46.950	$6.00
2034	$64.98	$40.00	$46.950	$6.00
2035	$66.64	$40.00	$46.950	$6.00
2036	$71.88	$40.00	$46.950	$6.00
2037	$73.69	$40.00	$46.950	$6.00
2038	$77.08	$40.00	$46.950	$6.00
2039	$80.03	$40.00	$46.950	$6.00
2040	$80.48	$40.00	$46.950	$6.00
2041	$85.39	$40.00	$46.950	$6.00
2042	$89.08	$40.00	$46.950	$6.00

† The Forecasted Market Energy and REC Prices are results determined from the TCR Quantitative Evaluation of the Gravel Pit Solar proposal, with the proposal in service. The forecast market energy prices are at the projects point of interconnection. (All prices are in Nominal$)

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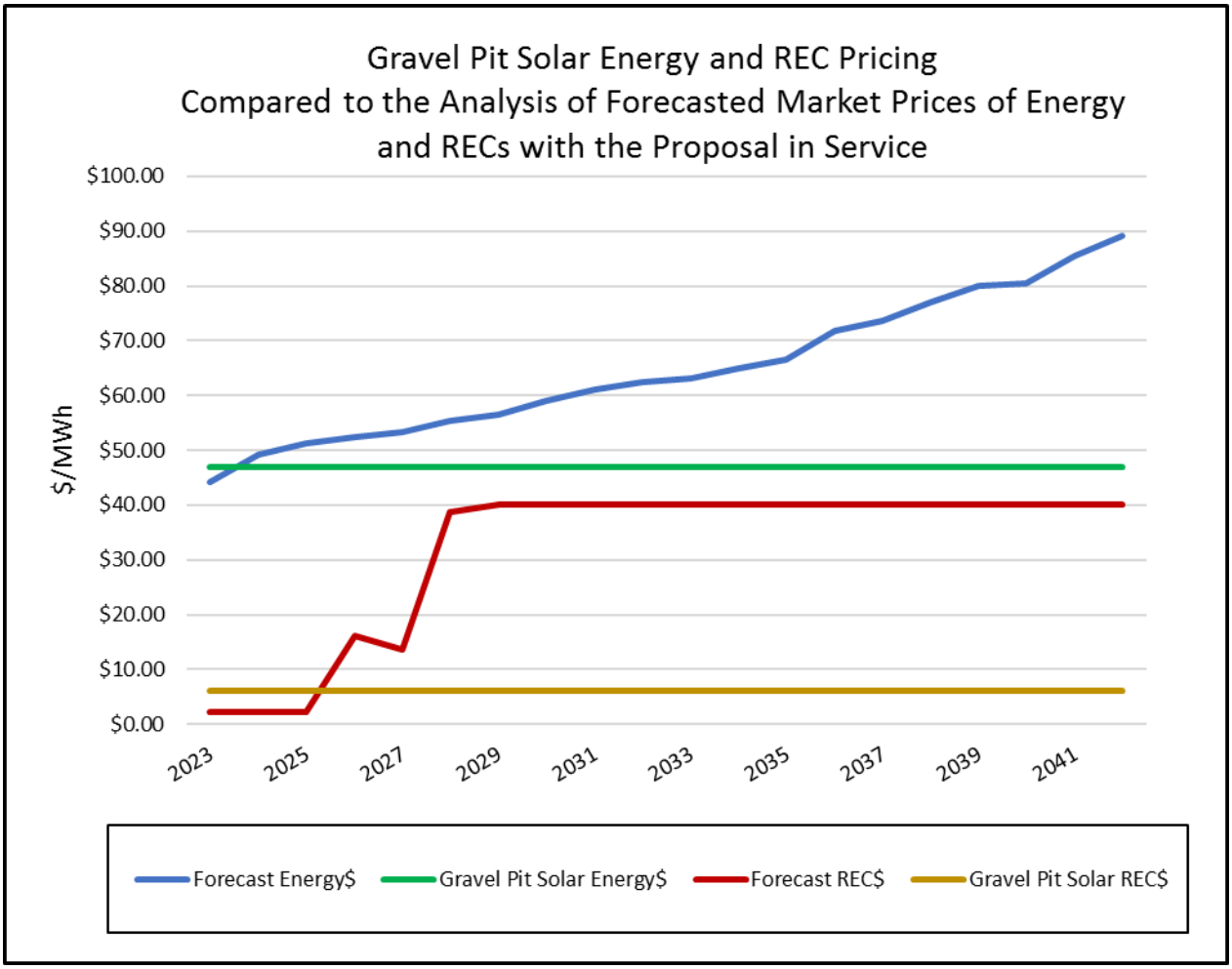

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PUC 1-18

Request:

What is the latest date the facility can achieve commercial operation under the PPA?

Response:

Gravel Pit Solar II has a Guaranteed Commercial Operation Date of March 31, 2023. Under the terms of the PPA, Gravel Pit Solar II may elect to extend any of the Critical Milestones listed in Section 3.1(a) by up to three six-month periods by posting additional Development Period Security. See Section 3.1(c) in the PPA. Therefore, absent a Force Majeure event, the latest date that the facility can achieve commercial operation under the PPA is September 30, 2024.

The PPA also contemplates the potential for a Force Majeure event, pursuant to Section 10.1, occurring and impacting the Seller's ability to achieve a Critical Milestone. See Section 3.1(d) in the PPA. If a Force Majeure event occurs that prevents the Seller from achieving the Critical Milestone by the applicable date listed in Section 3.1(a)(ii) and Section 3.1(a)(iv), then the Critical Milestone impacted will be extended for the duration of the Force Majeure event, but not-to-exceed 12 months beyond the applicable date. Therefore, in theory, the latest date that the facility could achieve commercial operation under the PPA is September 30, 2025 if the Seller both exhausted all of the milestone extensions in Section 3.1(c), and a Force Majeure event occurred pursuant to Section 10.1 and Section 3.1(d).

PUC 1-19

Request:

What was the cost of carbon emission in 2018$/ton used to evaluate the benefits and costs of the PPA? Please provide the source of this estimate and explain if this value intended to represent the social cost of carbon, the marginal abatement cost to meet Rhode Island's greenhouse gas reduction goals, or some other cost.

Response:

The non-embedded unit value of a reduction in carbon dioxide (CO_2) used to evaluate the benefits and costs each year was calculated as the difference between the marginal abatement cost of carbon from the 2018 Avoided Energy Supply Component (AESC) Study of $100 (2018$)/Metric ton and the projected Regional Greenhouse Gas Initiative allowance price each year in 2018$/Metric ton.

The source of this estimate is 2018 AESC Study: June 2018 release, at 13, which based on global marginal abatement costs, established a total environmental cost of $100 per short ton of CO_2-equivalent emissions.